FIOMARINE INDUSTRIES PTY LIMITED

ACN 074 357 869
ABN 91 442 031 533

TIME/DATE Model

Fiobuoy®

- USER MANUAL -

(Revision 1 July 2006)

Defence Recognised Supplier
Australian Defence Industry

Patents Pending
Fiobuoy® is a registered trade mark of Fiomarine Investments Pty Limited.
Copyright 2006 Fiomarine Investments Pty Limited. All rights reserved.

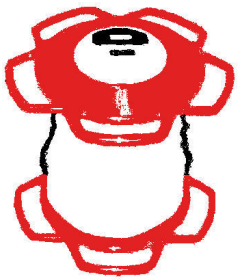
If you only ever read

one part of this manual,

read

Section 15.

‘ AVOIDING PROBLEMS - A LAST WORD ’



Contents

Page

1. FIOBUOY® CONCEPT - OVERVIEW 1
2. DESCRIPTION OF PRINCIPAL COMPONENTS 3
3. ATTACHMENT OF FITTINGS 5
4. COMMUNICATION WITH THE FIOBUOY® 6
4.1. WITH THE HAND HELD TERMINAL 6
4.2. WITH YOUR PC 8
4.3. WAKING (IE. ACTIVATING) THE FIOBUOY® 9
4.4. THE PASSWORD 9
4.5. THE BANNER 9
4.6. THE MENU 9
4.7. PROGRAMMING FOR DEPLOYMENT 10
4.7.1. MENU OPTION 1 - PROGRAM RELEASE EVENT 10
4.7.2. MENU OPTION 2 – SET BUOY CLOCK 13
4.7.3. MENU OPTION 3 - TEST JAWS 14
4.7.4. MENU OPTION 0 – THIS SCREEN 14
5. DEPLOYMENT 15
6. HIDDEN MENU OPTIONS 16
7. BENCH TESTING A RELEASE EVENT 18
8. ERROR CODES - FAULTS 20
9. MAINTENANCE 22
9.1. GENERAL 22
9.2. EXTERNAL MAINTENANCE PROCEDURES 23
9.3. INTERNAL MAINTENANCE PROCEDURES 23
9.3.1. REMOVING THE RELEASE MECHANISM ASSEMBLY 24
9.3.2. FIOBUOY® BATTERY PACK REPLACEMENT 25
9.3.3. INSPECTION AND SERVICE 26
9.3.4. ASSEMBLE AND TEST 27
10. WARRANTY 28
11. PRODUCT SPECIFICATIONS 29
12. HIDDEN MENU OPTIONS RE SECTION 6 30
12.1. RESET ACTUATION COUNTERS - MENU OPTION ‘91’ 30
12.2. DAILY BATTERY THRESHOLD -MENU OPTION ‘92’ 30
12.3. SET TIME/DATE CONFIRMATION OPTION - MENU OPTION ‘94’ 31
13. FIOBUOY® STROBE SUPPLEMENT 32
14. PARTS LIST 33
15. AVOIDING PROBLEMS - A LAST WORD 34
15.1. GENERAL SAFTEY AND COMPLIENCE OBLIGATIONS 34
15.2. BATTERY LIFE 36
16. CONTACTING US 37

1. FIOBUOY® CONCEPT - Overview

The FIOBUOY® is a submersible marine marker buoy which is designed to release itself from its underwater mooring at a predetermined time and date and ascend to the surface to fulfil its marking function.

The product was developed for the principal purpose of removing from the marine environment, unnecessary surface protrusions which, particularly under night conditions and in other circumstances where there is poor visibility, become hazardous to marine navigation. In addition to its marking function, the device provides access to submerged objects at specific times by permitting those objects to be retrieved via its connecting tether, rather than deploying special diving personnel.

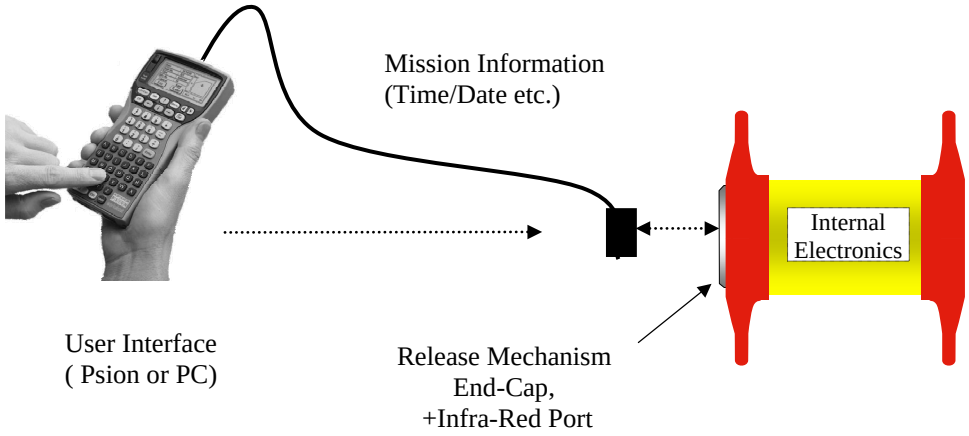
The process of ascent occurs as a result of positive buoyancy. The Release Mechanism built into the buoy is an electro-mechanical device which is computer controlled by an on-board electronic timing mechanism. The mechanism is programmed by a hand-held controller prior to each complete operation or deployment. The communication link between the buoy and controller is via an infra-red signal and is security coded.

The hand-held controller (or terminal) is a portable computer specifically supplied by Fiomarine Industries for programming the FIOBUOY®. The programming function can also be undertaken by either a standard desktop or laptop computer (ie. a PC).

The on-board electronics of the FIOBUOY® (Ver 1.1) therefore, permits communication by an operator using either a hand held terminal or a PC. *Communication* in this case is 'two way' and for normal operation means setting of Time/Date information so that the FIOBUOY® will release from its tether at some time in the future (known as a "**Release Event"**).

Time setting here is 'absolute' ie. you enter a specific time & date (as opposed to 'relative' where you would indicate a time ' x ' days/hours from now)

Pre-Deployment Programming and Setup of the Fiobuoy®



On a technical point, the FIOBUOY® is constructed with a 'zero leaks' philosophy, and so communication between the terminal and the internal electronics is accomplished via infra-red light actually transmitted through the casing. This method was chosen because conventional plugs and sockets not only leak, but also corrode in a harsh marine environment.

For the same reasons, there is no ON/OFF switch on the FIOBUOY®. Instead, the FIOBUOY® spends most of it's serviceable life in what we call **'Sleep'** mode. When 'asleep', very little power is consumed, and this allows for very long battery life.

The FIOBUOY® is 'awoken' from its sleep mode, in one of four ways:

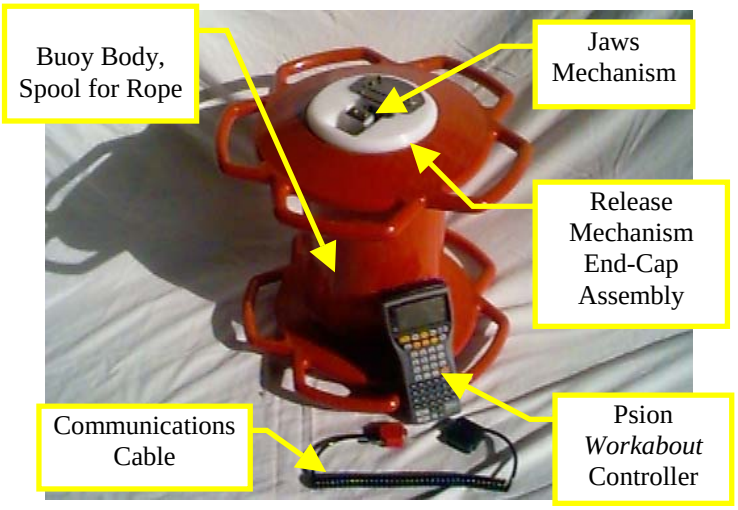
- By the User wanting to program Time/Date information etc.;
- When an actual Release Event is about to take place.;
- When a 'leak' is detected inside the chamber; or
- During its automated, daily diagnosis of battery condition.

After any 'awakening', 'sleep' mode is re-entered automatically following a predetermined period of inaction.

2. DESCRIPTION OF PRINCIPAL COMPONENTS

Illustrations of the principal components of the FIOBUOY® system are presented in the following:

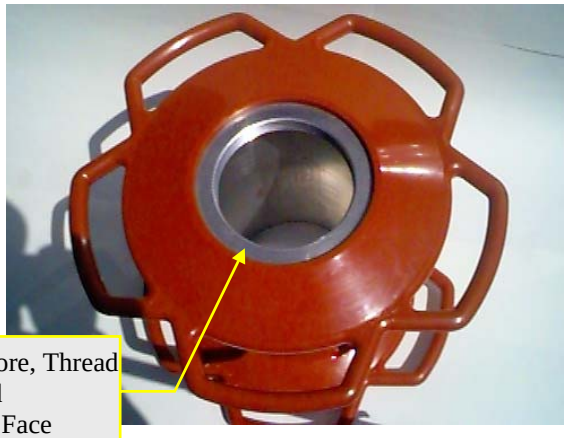
2.1 FIOBUOY®, assembled, with release mechanism (but without rope)



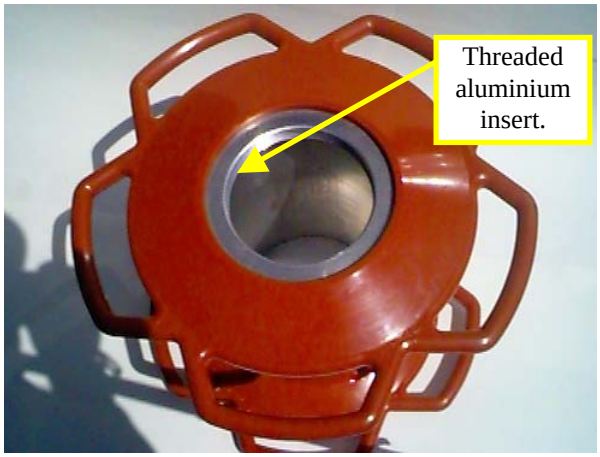
2.2 FIOBUOY®, assembled, with rope

Fiobuoy, assembled with rope

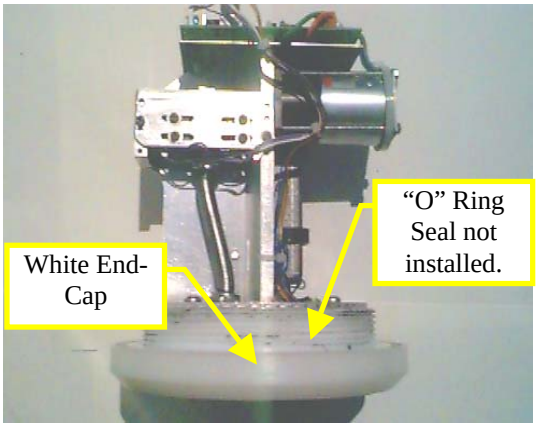
Fiobuoy, unassembled

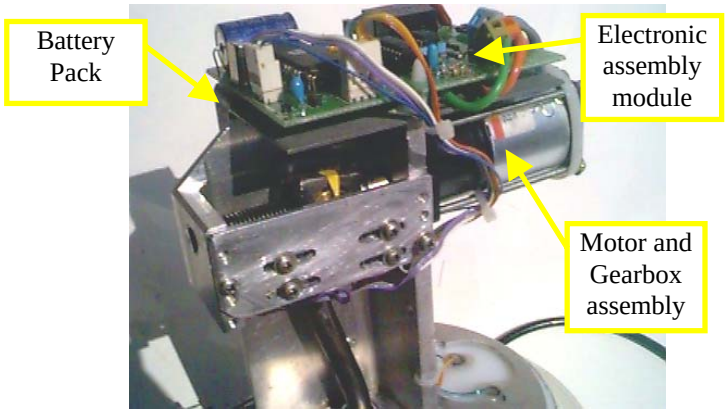


2.3 FIOBUOY® body, unassembled



2.4 Release Mechanism assembly, uninstalled





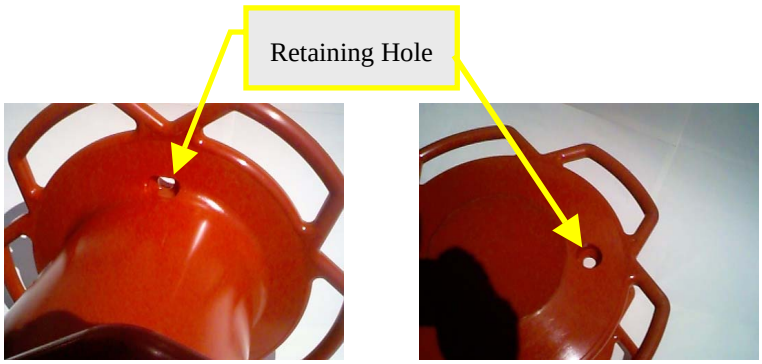
3. ATTACHMENT OF FITTINGS

The instructions in this section are intended to address the needs of those users who elected to separately purchase and install their own ropes. We strongly encourage those users to seek advice from Fiomarine Industries Pty Ltd on the correct selection of rope since this is critical to the proper performance of the FIOBUOY®.

Where the FIOBUOY® is already supplied with ropes and attachments installed, proceed directly to Section 4 "**COMMUNICATING WITH THE FIOBUOY®**".

To install the rope and fittings, please observe the following steps:

3.1 In the flange opposite to that containing the main aperture, locate the retaining hole shown in the following illustrations:



3.2 Pass one end of the rope from the inside of the flange through the hole; approximately 10cm to 15cm of length should be sufficient. Then tie a knot firmly with this length and then pull the rope back to the inside, making sure that the knot rests securely in (and is properly restrained by) the retaining hole. Cut off any excess length of rope (past the knot) on the outside of the flange to avoid possible entanglement during operation.

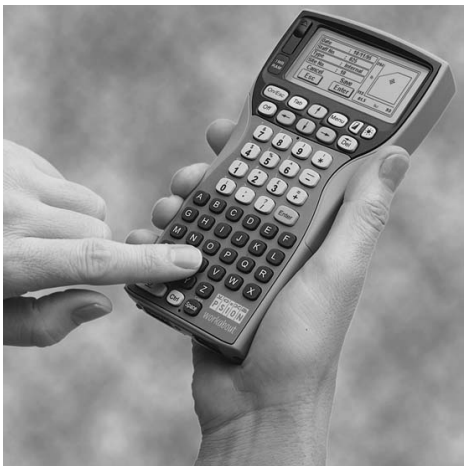
3.3 With the remaining length of rope, wind neatly around the centre core of the buoy body, leaving a minimum 400 cm of rope at the end.

3.4 Finally, the remaining 300 cm of rope is used to secure the anchor/equipment.

4. COMMUNICATION WITH THE FIOBUOY®

4.1. With the Hand Held Terminal

We have selected the well known PSION ***work****about* Hand Held Terminal as the preferred unit for communications for the FIOBUOY®. As supplied by us, it is set to start up and automatically boot to its communications mode at switch on, with a screen format of 29 characters by 12 lines.



Generally, for normal operation you will use the following keys:

- the number keys **1234567890**
- the **[Enter]** key
- the **Y** & **N** keys (for Yes and No responses)
- the **[Del]** (delete/backspace) Key

We have also included the PSION ***work****about* User Guide. We recommend you read the initial chapters about its general use as **none of that information is duplicated in this Instruction**. Also you may find a use for this very versatile device. Please refer to the User Guide should any non routine events arise.

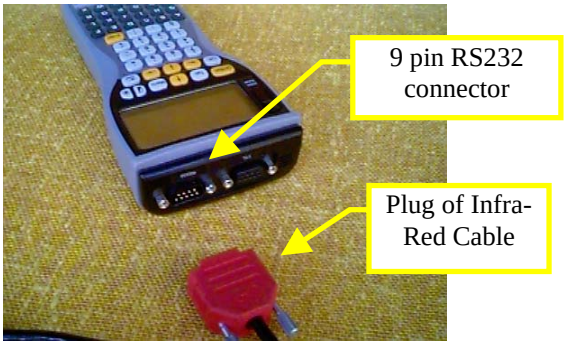
Psion Battery Replacement and reset.

On occasions, after replacing the Lithium Battery, or via inadvertent action by the User, the Psion may loose some factory settings. The following is a quick guide to resetting these parameters. From a fully powered down state –

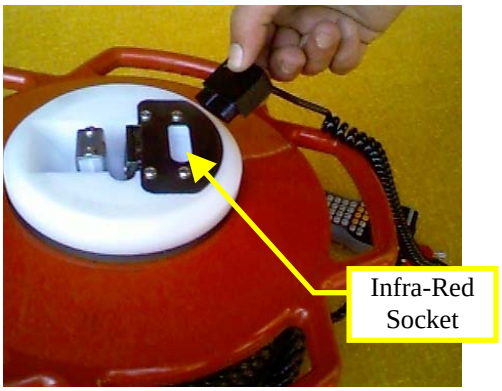
- Insert Main and Lithium batteries and press [On/Esc]
- Wait for the Psion banner to appear, the press [Menu]
- Select 'System screen' (using the arrow keys), press [Enter]
- From the screen showing icons labelled- 'Data', 'Calc' and 'Sheet', arrow right until 'Comms' is selected, press [Enter].
- Set comms parameters by holding down the special Psion key **U** and pressing [J], adjust the 'Baud rate' parameter to '1200', and the 'Port' to 'A'. Press [Enter] to accept changes and exit.
- Hold down the Psion key **U** again, and press [K]. Alter the 4 parameters if necessary so they are sequentially: On, Off, Off, Off in that order. Press [Enter] to exit.

The Psion is now set for Infra-Red comms to the Fiobuoy® or DIU.

Connect the curly Infra-Red Cable (supplied) to the 9 pin connector marked RS232, at the top of the ***work****about*.



The other end of the cable, plugs into a special optical socket which is located at the 'Jaws' end of the FIOBUOY®. This socket should be kept clean to allow reliable communications.



Press the yellow [On/Esc] button, and the ***work****about* will power up ready for you to establish communications.

4.2. With Your PC

If you are using a PC, connect the curly cable (supplied) to your spare 'Comms' port. The other end of the cable, plugs into a socket located at the 'Jaws' end of the FIOBUOY®. This socket should be kept clean to allow reliable communications.

Turn you PC on, and run any general purpose Terminal program (ask your FIOBUOY® supplier if you need help with that). Set the comms setting to 1200 baud, 8 bits, no parity, 1 stop bit (with plain TTY type protocol). Ensure the Comm Port parameter (ie Comm1) is the one you have plugged the cable into !

Generally, for normal operation you will use:

- the number keys **1234567890**
- the **[Enter]** key
- the **Y** & **N** keys (for Yes and No responses)
- the **[BS]** (backspace) Key

Connection is the same as described on the previous page.

** For laptops which do not have RS232 Comm Ports, converters for USB ports are available from electronics outlets.

4.3. Waking (ie. activating) the FIOBUOY®

Simply press the 'Enter' key twice (not pausing longer than ½ sec between).

4.4. The Password

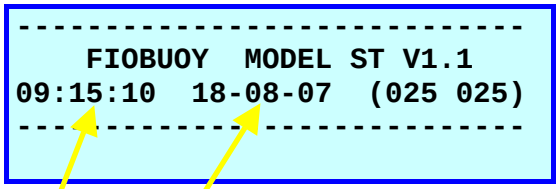
You will then be shown the unit's Serial Number and prompted to enter your password (supplied). This is a preset password and is not changeable. It is a 'security tool ', intended to guard against misuse of your FIOBUOY® . It needs to be protected accordingly.

```
wake
  Buoy Serial No. 01J0001
  Enter Password: _
```

(When keying in your password, 'Backspaces' are allowed, and the [Enter] key is necessary to finish. If no password is received within 12 seconds, Sleep mode is re-entered automatically.)

4.5. The Banner

Next, on the top half of your screen, you will see a Banner showing the Model and Version Number of your FIOBUOY®.



Other information given here is:

- the Time and Date of the FIOBUOY's own ***internal*** clock/calender
- 2 counters (in brackets).

The two counters keep track of (successful) jaw mechanism actuations ('Openings' and 'Closings' respectively). They are provided for your information and may be retained, or reset to zero at any time.

4.6. The MENU

Appearing directly below is a numbered Options Menu:

```
1. Program Release Event
2. Set Buoy Clock
3. Test Jaws
4. Go To Sleep
0. This screen
> _
```

followed by the **>** command prompt. *(_ indicates the screen cursor)*
The [Enter] key is not needed to select these menu options

Now let's look at each of the Menu Options and the programming required for deployment.

4.7. PROGRAMMING FOR DEPLOYMENT

4.7.1. MENU OPTION 1 - Program Release Event

Consistent with the overall philosophy of the FIOBUOY® system, this is the time and date (in the future) when you want your buoy to release from its primary tether, and float to the surface for equipment retrieval.

*Note: There is no automatic return to sleep mode '**during'** any of these programming stages.*

STAGE 1: Setting the Release Event Date

User:
Buoy:

```
1
Release Date: (DD-MM-YY)
   [16-08-06]: _
```

The date in (round) brackets is a guide for the format and sequence of input:

- DD means day of the month (01 to 31),
- MM means the number of the month (01 - 12),
- YY is the last 2 digits of the year (00-99).

Note that two digits are expected for each, so, for instance the 8th should be entered as 08. Backspace is not supported here. If a mistake is made during entry, continue (ie. complete the entry), then start again. Before and after each 'month', hyphens are automatically inserted ***so there is no need to type them in.***

The date in [square] brackets is the date previously programmed into the FIOBUOY®. **By pressing [ENTER] you can leave it unchanged** ! Or you can enter a new date for your future Release Event in the format expected.
The following example is for 28th August 2007:

User:
Buoy:
User:

```
        280807
Confirm: _
        280807
```

As a precaution against errors, you are asked to re-enter the date as confirmation.
Note: This "confirmation" feature is user configurable. It can be disabled so that date and time need only be entered once each (see Hidden Menu Options). It does not apply to setting the Buoy's own internal clock.

STAGE 2: Setting the Release Event Time

Buoy:

```
Release Time: (hh:mm)
   [09:00:00]: _
```

You are now asked for the time of day for the future **Release Event** (in 24 hour format). Only hours and minutes are needed (seconds are set to 00 automatically). A 'colon' is automatically printed between hours and minutes for clarity. Again, ***don't type it in.*** As with the date format, single digit times should have a leading zero (eg. for 9:15am, enter 0915).

User:
Buoy:
User:
Buoy:

```
         0915
 Confirm:_
         0915
Set for 09:15:00 on 28-08-07
OK to close ? _
```

STAGE 3: Closing the Jaws

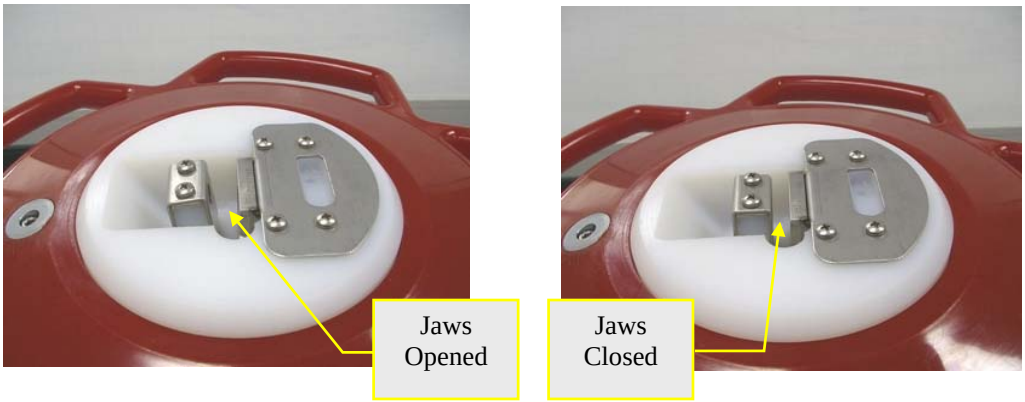
The Mechanical Jaws are about to be closed !. They are quite powerful, so you are strongly advised to avoid touching the jaws during closure in order to prevent personal injury. You are prompted for an OK to proceed. Entering a 'Y' (or a 'y') will be taken as a Yes/OK. **ANY OTHER RESPONSE** will be interpreted in the negative.
Closing the jaw mechanism can take up to 30 seconds:

User:
Buoy:

```
Y
Closing Jaws...  Closed !
 6.0V before, 5.7V during.
> _
```

NOTE: When fully open, the jaws are approximately 15 mm apart; when fully closed, they continue to remain apart but at a distance of approximately 10 mm. Therefore, jaw closure represents a movement of only some 5 mm, which is sufficient to secure the spherical end of the release pin within the plate cavities of the jaws.

CAUTION SHOULD BE EXERCISED DURING JAW CLOSURE TO PREVENT PERSONAL INJURY.



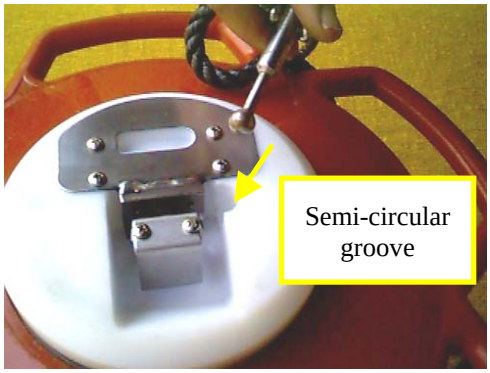
The two battery readings displayed on the screen are intended to inform the user on the condition of the battery pack. The “before” reading represents the condition under no load while “during” represents the condition under load (ie. during the closing process). If the control circuitry deems the battery to be too low, the closure is aborted and the jaws return to the open position. The default threshold is set at 5.0V (non-loaded).

STAGE 4: Inserting the release pin

You should now fit the **release pin** into the jaw mechanism. Ensure it is located properly and the tether line is made fast in accordance with the following:

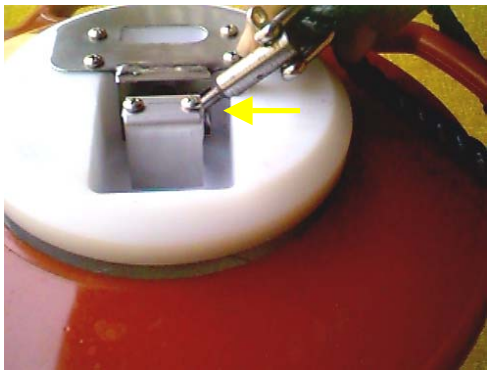
Step 1.

Locate the semi-circular groove within the white end-cap and insert the spherical end of the pin down the groove as far as possible:



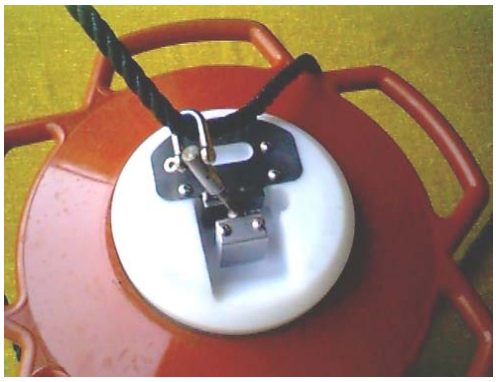
Step 2.

Slide the spherical end of the pin along the base of the jaws, toward the centre of the jaw plates:



Step 3.

Hold the pin upright, and give a firm tug upward so there is an obvious 'click' when the spherical end of pin engages into the plate cavities of the jaws, and is held fast:



4.7.2. MENU OPTION 2 – Set Buoy Clock

This operation is to be performed should you need to adjust the time and date of the buoy's own ***internal*** clock/calendar as local time. It is particularly relevant during changes between standard and daylight savings times. The steps are almost identical to Menu Option 1.

STAGE 1: Setting the Buoy Date

User:
Buoy:

```
2
Buoy Date:  (DD-MM-YY)
 [16-08-07]: _
```

The date in (round) brackets is a guide for the format and sequence of input:

- DD means day of the month (01 to 31),
- MM means the number of the month (01 - 12),
- YY is the last 2 digits of the year (00-99).

Note that two digits are expected for each. For example, the 8th should be entered as 08. Backspace is not supported here. If a mistake is made during entry, continue (ie. complete the entry), then start again. Before and after each 'month', hyphens are automatically inserted ***so there is no need to type them in.***

The date in [square] brackets is the date previously programmed into the FIOBUOY®. **By pressing [ENTER] you can leave it unchanged** ! Or you can enter a new current date in the format prescribed.

Note:
Leap years are supported automatically.

The following example is for 28th August 2007.

User:
Buoy:

```
          280807
Buoy Time:  (hh:mm)
 [09:00:00]: _
```

STAGE 2: Setting Buoy Time

You are now asked for the current time of day (in 24 hour format). 'Colons' are automatically printed between hours, minutes and seconds ***so you don't need to type them in.*** As with the date format, single digit times should have a leading zero (eg. for 9:15am, enter 0915).

User:
Buoy:

```
         0915
Set for 09:15:00 on 28-08-07
> _
```

4.7.3. MENU OPTION 3 - Test Jaws

Intended as a utility routine only, this procedure closes the jaws, then re-opens them, once. *There is no automatic return to sleep mode during this menu option.*

User :
Buoy:
User:
Buoy:

```
3
Proceed ? (y/n) _
Y
Closing Jaws...  Closed !
 6.1V before, 5.9V during.
Opening Jaws...  Opened !
 6.1V before, 5.9V during.
> _
```

As in Menu Option 1, should the battery voltage be too low, the procedure is aborted with the Jaws returning to the open position (if at all possible).

4.7.4. MENU OPTION 0 – This Screen

Returns the Banner and Menu to the Screen.

- **In this section you have learned how to set the buoy's internal clock/calendar, program a Release Event and test the Jaw Mechanism. You are now ready to deploy the FIOBUOY®.**

5. DEPLOYMENT

Successful deployment will require careful preparation and planning before you take to the water. The steps required for immediate deployment are as follows:

- Ensure that the internal clock/calendar of the Fiobuoy is set to the current local time and date in accordance with instructions provided in this manual.
- Ensure that the Release Event time and date have been programmed and that the jaws are in the closed position.
- Fasten the remaining portion of the tether line to the anchor and/or equipment which is to be submerged. The fastening process may involve a simple tie or a shackle arrangement.
- Check all rope connections and ensure the release pin is properly engaged by the jaw mechanism.
- Check to ensure that all settings have been properly recorded and logged, such as time and date of scheduled release and the exact co-ordinates of the position at which the unit is being submerged.
- It is advisable to perform an 'in-air' check of the Acoustic system before deployment.

Commence the submerging process. First lower the Fiobuoy into the water so that it is floating. Then lower the mooring-weight/equipment into the water, and gently release the line. *Never **throw** the devices overboard*.

Both the mooring/equipment and the Fiobuoy will then commence their descent to the sea bed where the Fiobuoy will adopt a vertical attitude and maintain a tension force on its tether-line equal to that of its own buoyancy.

6. HIDDEN MENU OPTIONS

The software installed within the FIOBUOY® is programmed to provide flexibility with the product's operation. In particular, certain functions can be modified to suit specific end user requirements.

However, we strongly recommend that only those users who are appropriately qualified should attempt such modifications. We further recommend that any attempt to alter the factory default settings should be made with the assistance of an authorised dealer or, representatives of Fiomarine Industries Pty Ltd.

Those changeable functions include:

6.1 RESETTING THE ACTUATION COUNTERS

The counters recording the number of actuations (ie. openings/closings) have a maximum value of 255 before automatically resetting to 000. Some users may wish to reset the counters to 000 before reaching the maximum values, or to preset the counters to a different value, where there is a requirement to monitor specific performance/operating characteristics.

6.2 DAILY BATTERY THRESHOLD

The electronics assembly contains a diagnostic feature which automatically measures battery life/voltage on a daily basis under a "no load" condition.

This feature is designed to actuate the release mechanism (and consequently override the Release Event Date) where there is a risk of the battery running "flat" prior to the date of scheduled release. It is also designed to prevent deployment of the FIOBUOY® where the battery voltage is considered too low.

The factory default is set at 5.0 volts.

Therefore, as soon as the daily battery check establishes the voltage at, or below the default threshold, the FIOBUOY® should either:

(a) release itself from its tether (if already deployed); or
(b) prevent deployment by rejecting the command to close the jaw mechanism.

Certain "critical" deployments may require that the battery voltage threshold be adjusted up or down to accommodate specific needs. For example, under extremely cold conditions which tend to rapidly diminish battery capacity and performance, it may be prudent to increase the threshold above 5.0 volts to ensure that sufficient power will be available to perform the release function.

Alternatively, a particularly critical deployment may dictate that any "unscheduled" release is totally unacceptable in which case, the user can exercise the option of resetting to a lower threshold or completely disengaging the diagnostic feature.

6.3 TIME/DATE CONFIRMATION

When entering Release Event information such as date and time, the program requires the data to be entered twice as confirmation of correct input. This requirement is a default setting.

Some users may find the duplicate command to be inappropriate to their requirements and accordingly under this option, are able to delete the confirmation step from the programming routine.

7. BENCH TESTING A RELEASE EVENT

The object of the following bench test is to enable users to become familiar with the functioning of the FIOBUOY® and the processes which occur after it is programmed for a specific Release Event.

The FIOBUOY® actually awakens once each day, **at the time** programmed during Menu Option 1, ie. at the **Release Event time**. It continues to wake at that same time each day (followed by a resumption of its sleep mode) until the day on which the Release Event is scheduled to occur.

The tests illustrated here depict how the FIOBUOY® should respond to an automatic wake up prompt by its internal clock:

- during a day other than the Release Event date; and
- on the day of a programmed Release Event.

Ensure that prior to conducting the following tests, the buoy's internal clock/calendar has been correctly set with current time and date in accordance with Menu Option 2 (on pages 13 and 14). With the Psion Workabout (or PC) plugged in to monitor proceedings, each of the following tests should yield the corresponding screen outputs:

(a) <u>Wake up during a day other than the Release Event date</u>

Test Steps:

1. Set the Release Event **date** in accordance with Menu Option 1, Stage 1 (on page 10) for **any future date**.

2. Set the Release Event **time** in accordance with Menu Option 1, Stage 2 (on page 11) at say, **5 minutes ahead of the current time**.

3. Close the jaws in accordance with Menu Option 1, Stage 3 (on page 11)

As soon as the 5 minute period has elapsed, the corresponding screen display will show -

Buoy:

(b) <u>Wake up on the day of a programmed Release Event</u>

Test Steps:

1. Reset the Release Event **date** (in accordance with Menu Option 1 etc.) to **the current date**.

2. Reset the Release Event **time** (in accordance with Menu Option 1 etc.) to say, **5 minutes ahead of the current time**.

3. Close the jaws (in accordance with Menu Option 1, Stage 3 etc.)

As soon as the 5 minute period has elapsed, the corresponding screen display will show -

Buoy:

```
wake by Clock
Opening Jaws...  Opened !
 6.0V before, 5.7V during.
Going to Sleep
```

If your test procedures resemble the outputs depicted above, you can be assured that the operating system is operating correctly.

8. ERROR CODES - FAULTS

Error codes appear with the Command Prompt and indicate the presence of a fault within the buoy's operating system.

eg.

They remain in force until specifically reset by an operator after the faults have been rectified. **A jaw closure is not possible if there is an uncleared error in force. This is designed to prevent accidental deployments which could otherwise have compromised equipment safety.**

There are three (3) types of error code and each is displayed in the following table, together with their corresponding interpretations and prescribed courses of action.

ERROR	CAUSE	YOU SHOULD
01	The system detected that the battery power was too low, during a daily wake-up / battery diagnostic check. It then proceeded to carry out an emergency Release Event (*with obvious success!*)	If the unit is subject to warranty, return it to a dealer or factory for inspection and service including replacement of battery pack. If warranty has expired, proceed to change battery pack and service as per Section 10.
02	The system attempted to close the Jaws, but after an amount of time (40 sec.) no closure was detected. The operation was then aborted	Submit the unit to a dealer or factory for inspection and repair.
03	The leak detectors suggest that water may have entered the chamber. The system then proceeded to carry out an emergency Release Event.	Submit the unit to a dealer or factory for inspection and repair.

Resetting Error Codes

Error codes may be reset back to “00” for normal operation if each of the causes has been properly identified and the appropriate repairs/servicing completed by qualified persons.

The resetting mode is accessible via hidden Menu Option “93”. The resetting procedure is as follows:

1. Go to the numbered Options menu.
2. At the command prompt, enter “93”.
3. The buoy will respond with the appropriate error code eg. “01”.
4. Enter “00” (zero zero) and nothing else.

The corresponding screen display should look like this-

User:
Buoy:
User:
Buoy:

```
93
01: _
00
>_
```

If, upon entering Menu Option 93, it is decided that the error code should be left intact (and not reset), simply press “Enter” to leave the value unchanged. **We emphasise that error codes should not be reset without a prior inspection of the equipment by qualified personnel.**

9. MAINTENANCE

This Section relates solely to the FIOBUOY® and not the PSION ***Workabou***t. Maintenance for the latter is covered separately in the manual which accompanies that product.

9.1. General

The FIOBUOY® has been constructed with a minimum of moving parts and therefore, requires minimum maintenance where moderate deployments are envisaged.

However, at times, the product will be used within extremely harsh environments where a combination of elements such as salt water, pressure (at significant depths), marine growth, temperature extremes etc. are likely to affect its operation and therefore, its service life.

With average use under moderate conditions, we recommend that servicing / maintenance be undertaken every 9-12 months. With a higher frequency of use under more extreme conditions, servicing and maintenance should be undertaken every 6-9 months if possible.

The Time/Date Model Fiobuoy comprises two major components :

(a) The body (or casing) of the buoy; and
(b) The release mechanism assembly which fits into the cavity of the body via single aperture at one end of the body.

A condition of warranty offered by Fiomarine Industries Pty Ltd expressly prohibits the user from removing the release mechanism in order to conduct **internal maintenance**. Accordingly, we suggest that any internal maintenance be performed either by an authorised dealer or, by Fiomarine Industries Pty Ltd for at least the duration of the warranty. **External maintenance** by the user on the other hand, is encouraged and we recommend that users practice the following routine as part of a regular maintenance program.

In summary, we suggest that external maintenance should be performed by the user whereas any internal maintenance should, while the product is subject to warranty, be performed by authorised personnel only.

9.2. External Maintenance Procedures

A.1 Immediately prior to and following each deployment, inspect the white end-cap for signs of any cracking around the clamping mechanism. Contact either your local dealer or Fiomarine Industries Pty Ltd for further instructions should you detect any such wear or damage.

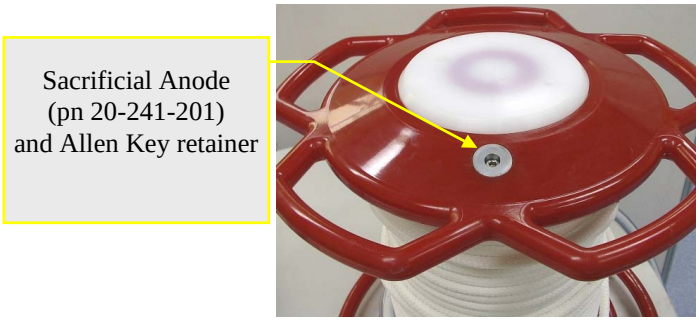
A.2 Inspect for any marine growth and debris, particularly around the clamping mechanism and communications socket. Remove any obstruction with a stiff brush.

A.3 Immediately following each deployment and during the process of rewinding the rope on to the buoy, inspect the rope for any appreciable wear and replace if necessary. Also inspect the shackles and other rope attachments to ensure they are properly secure.

A.4 In the event the FIOBUOY® is to be either placed into storage or, not used for an extended period following its last deployment, rinse the buoy and its rope and attachments with fresh water before stowing away.

A.5 When placing the FIOBUOY® into storage, interrogate for details of any programmed Release Event and cancel where necessary.

ANODE
Some Fiobuoy models employ a Sacrificial Anode within the body moulding to reduce the effects of electrolytic corrosion. This anode needs to be inspected regularly and replaced when it has become depleated. For replacement a 4mm Allen Key is required.



9.3. Internal Maintenance Procedures

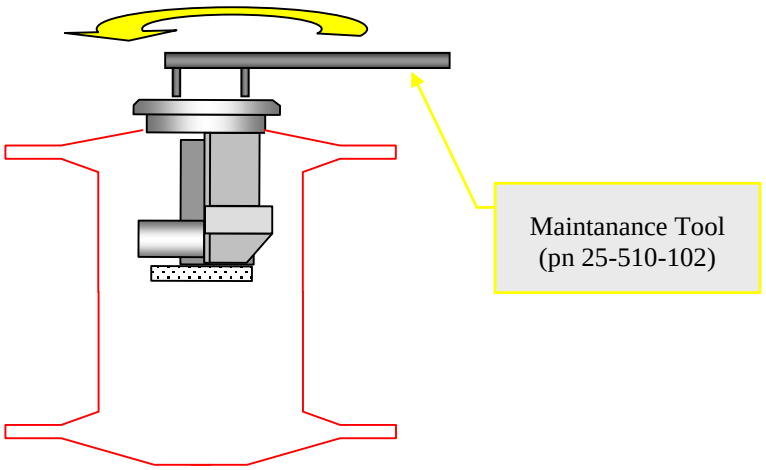
The frequency of internal maintenance is dependent entirely upon the extent of use and the environmental conditions in which the FIOBUOY® operates. For example, operating in extremely cold conditions for extended periods is likely to shorten battery life, thereby creating a need for more frequent maintenance involving battery and seal replacement.

The following is a summary of recommended internal maintenance and inspection procedures for those users who wish to conduct their own maintenance program following the expiration of the warranty period. We recommend that all maintenance activities be undertaken in a proper workshop environment and not on board a marine craft whilst at sea.

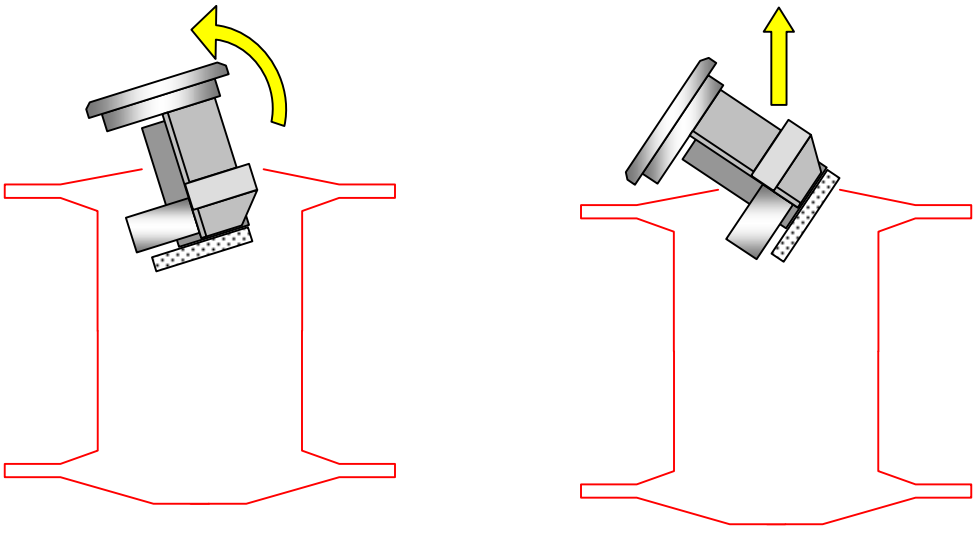
9.3.1. Removing the Release Mechanism Assembly

- During this operation, the body of the buoy must be held securely either by another person or, by placing it in a position which will prevent it from turning while the white end-cap is being removed. Also ensure that the jaws are in an open position and that the release pin is removed.

- Insert 'Maintenance Tool' into the two holes in the white end-cap. (The end-cap is permanently fastened to the frame of the release assembly and so by turning the end-cap, the assembly also turns). After several revolutions, the end-cap can then be further loosened by hand until the thread completely disengages from the neck of the buoy.



- Gently remove (ie. pull out) the entire assembly from the body of the buoy, taking care to avoid contact between the mechanicals/electronics of the assembly and the neck of the buoy.



- Upon completely removing the release mechanism assembly, stand it upright on a flat surface with the white end-cap at the base.

9.3.2. FIOBUOY® Battery Pack Replacement

With the mechanism unscrewed and removed from the Buoy housing:

1. If not so already, place the FIOBUOY into 'Sleep' mode.

2. Remove the old Battery Pack. To ensure full power down.**Wait for 10 minutes** before installing the new one into the Battery Compartment Make use of the new rubber retaining loops. The Battery Pack should be oriented so the wires exit the pack at Top Left.

3. Bend the 2 wires around to the other side of the mechanism, running them outside the blue and gray Motor Wires to the battery connection terminal blocks.

4. Remove the 2 insulating End Caps.
   *** * DO NOT SHORT THE TWO BARE WIRES TOGETHER.* ***

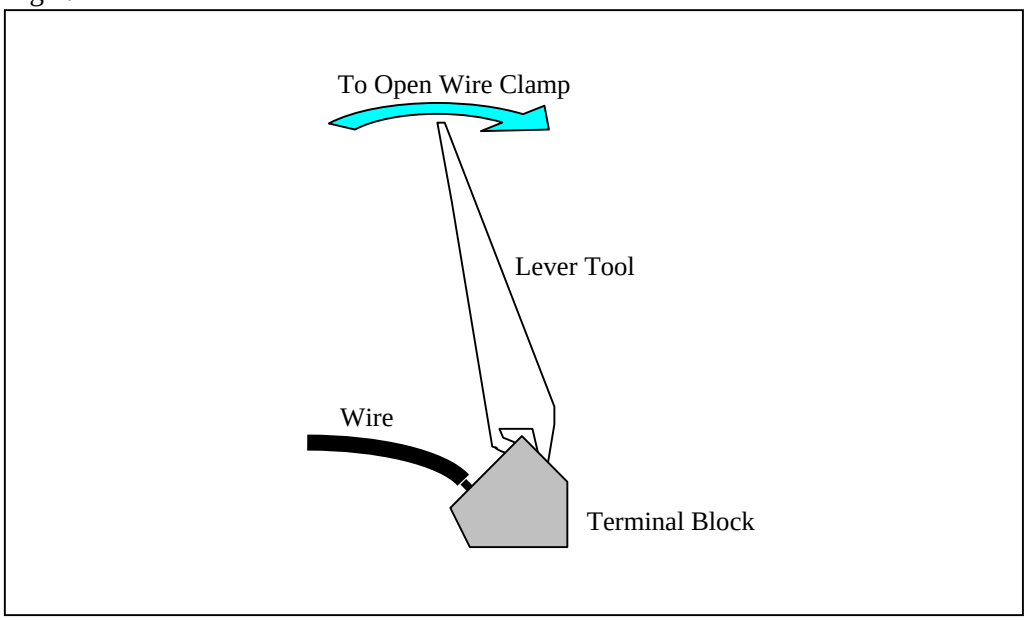
5. Using the white Lever Tool (supplied), insert the wires into the lower of the two holes, by first opening the spring loaded wire clamp, as per the diagram below (orange wire goes into the orange terminal block, and green into the green one).

6. Test communications as per normal, and reset the internal clock / calender if required.

Note: Should the FIOBUOY fail to respond to communications after the battery change, a Reset may be necessary:

- Locate the Jumper on the printed circuit board, labeled "RST".
- A shorting link will be sitting on just one of its two pins.
- Pull it off, and place it on both pins for 2 seconds.
- Return it to its original position.

Fig 1.



9.3.3. Inspection and service

- Remove and discard “O” ring seal.

- Carefully examine both the chamber of the buoy body and the mechanism assembly for evidence of any moisture. (Where moisture is detected, contact Fiomarine Industries Pty Ltd for further assistance on a suitable course of action. Care should be taken to observe and note the preciseamount of moisture, the location/s at which it was detected and whether the FIOBUOY® was recovered as a consequence of an unscheduled Release Event. It is possible that the unit will have to be returned to the factory for repair or refurbishment).

- Where moisture is not detected, proceed to remove and discard the battery pack by firstly removing the battery harness; also remove the sachet of silicate crystals located behind the battery pack.

- The clamping mechanism has only three moving parts and therefore, requires only minimal lubrication. Lubrication may need to be applied only to the following components:

    1. The **motor and gearbox assembly** are factory lubricated for life and therefore, should not require any further attention.
    2. **Lead screw and clevis nut** - apply Castrol LM grease (or equivalent) sparingly to the lead screw every 12 months.
    3. The thread of the **white end-cap** should be lubricated with a silicon based grease each time the unit is serviced.
    4. A new **“O” ring seal** should be installed with each service. It should also be lubricated with a silicon based grease and then inserted into the grooved cavity of the white end-cap.

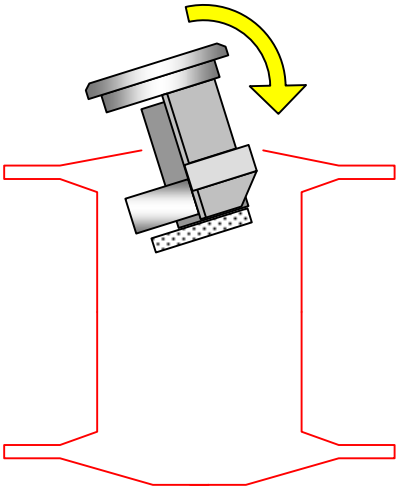
- Insert a new sachet of silicate crystals behind the battery pack.

- Attach a new battery pack and harness.

- Examine the surface of the external, aluminium rim of the buoy (which interfaces with the “O” ring seal and white end-cap) to detect any residue from the previous seal. Wipe surface clean to ensure smooth contact and proper seal with facing “O” ring and end-cap.

9.3.4. Assemble and test

- Gently insert the Release Mechanism assembly into the buoy, again taking care to avoid contact with the threaded neck of the buoy.



- Engage the threaded end-cap with the corresponding of the buoy and commence to hand-tighten by turning 3-4 revolutions clockwise.

- Before further tightening, conduct a bench test to ensure that all the mechanical and electronic functions are operating correctly. (If any faults are detected during the test, you have the option of either dismantling the unit for further inspection and testing or, contacting Fiomarine Industries Pty Ltd for further assistance).

- In the likely event the test is successful, continue the tightening process by hand and then using the adaptor and torque wrench, finally torque the End-Cap to 60 Nm. (+/- 10Nm)

SPECIAL NOTE:

We strongly recommend that you replace the “O” ring seal each time the release mechanism is removed from and reinserted into the body of the FIOBUOY®. This assumes of course, that deployments have occurred during the intervening period.

For each routine service (between 9 and 12 months), we also recommend that you replace the battery pack.

A special battery and maintenance kit is available from your local authorised dealer or from Fiomarine Industries Pty Ltd and contains the following items:

- Battery harness x 2
- Alkaline battery pack-6V x 1
- “O” ring seal x 1

10. WARRANTY

The FIOBUOY® product and its accessories are covered by separate warranties as indicated below:

(a) Hand Controller - Psion brand "Workabout"

This item is warranted in accordance with the conditions prescribed on the relevant warranty sheet from Psion Computer Plc of the UK. Any matters relating to warranty should in the first instance, be referred to the National Service Centre of an authorised Australian distributor;

Bar Code Data Systems
Lakes Business Park, Level 2 Building 8
Lord Street
Botany NSW 2019 Australia
fax: + 61 2 8336 6300
Phone 02 83366338

(b) FIOBUOY®

This product is warranted by Fiomarine Industries Pty Ltd to be free from defects in workmanship and materials for a period of twelve months from the date of purchase subject to the following conditions:

1. The product must be returned to us, freight and insurance pre-paid, together with purchase invoice/receipt as proof of purchase.
2. The product must not have had its serial number removed, defaced, or changed, its casing opened, its cabling or cord altered, nor have been tampered with in any other way.
3. Failure of the product must not be due to misuse such as failure to observe proper operating instructions and product limitations, improper installation or connection, other abuse, neglect, accidental damage or other circumstances beyond our reasonable control.
4. Responsibility is not accepted for damage or loss caused during transit or damage caused by other third parties.
5. Apart from warranties necessarily implied by law, all other warranties, express or implied, and whether arising by virtue of statute or otherwise, are hereby excluded.
6. All repair costs for any products which are found to be faulty due to abuse, misuse, neglect, accidental damage, improper installation or improper operation, shall be charged to the purchaser in accordance with our current schedule of fees.
7. All batteries are specifically excluded from warranty.

11. PRODUCT SPECIFICATIONS

ON-BOARD Electronics -

Power Supply ..... Battery Pack - 6VDC, 5AH

Power Consumption
- Sleep Mode ..... 100uA (approx)
- Wake Mode ..... 1 - 20mA
- Jaw Actuation 200-500mA

Battery Pack Life:
- assume average 150 Jaw Actuations ..... 1 Year min

Storage Temperature ..... -20 to 50°C

Operating Temperature ..... 3 to 50°C

Clock Accuracy ..... +/- 10 min/year @ 25°C

Communications
- Medium ..... Infra-Red LED Tx/Rx
- Protocol ..... Ascii, Full Duplex, DCE, 1200 baud, 8 data bits, 1 stop bit.

Auto Return to Sleep Mode
- at Wake ..... after 1 Second
- at Password ..... after 12 Seconds
- at Main Menu ..... after 30 Seconds

OPERATING-

	100m Model	200m Model
Maximum recommended deployment depth……	100m	200m
Tether line/rope length (10mm marine cord)	up to 120m	up to 250m
Buoyancy lift (sea water)	3.5 kg	8 kg
Weight in air without rope	13 kg	15 kg
DIMENSIONS-		
Overall Diameter	410mm	410mm
Overall Length	350mm	650mm
Access Hole to Cavity	120mm	120mm
Internal Free Space Dia	170mm	170mm [i]
Internal Free Space Length	120mm	350mm

[1] The 200m Fiobuoy® cylinder has 2 internal Reinforcing Rings (180mm apart) which have internal Diameters of 120mm

CONSTRUCTION-

Aluminium Cylinder encased in moulded polyurethane polymer
Endcaps: HDPE. Internal mechanisms: Aluminium & Stainless Steel.

12. HIDDEN MENU OPTIONS RE SECTION 6

Access to the functions specified in Section 6 is available via the following menu options and each option, eg.”91” etc. is entered at the command prompt in the (main) numbered “Options Menu”.

12.1. Reset actuation counters - Menu Option ‘91’

This option sets/resets the two counters which record the number of jaw actuations (ie. openings and closings). They appear in brackets within the Banner Menu. These counters have a maximum value of 255, and automatically default to “000” to begin the counting again.

The following example shows the two counters which have progressively recorded 5 openings and 5 closings:

User:	**91**
Buoy:	**005 005: _**
User:	**000000**
Buoy:	**>_**

To reset each of the counters back to 000 as in the above example, two sets of “000” (ie. six zeros) must be entered.

In this version (1.1), full 3 digit numbers are expected for each counter, so you must enter 6 digits in total. Pressing [Enter] leaves the values unchanged. Back Space is not supported; if you make a mistake, continue to the end then start again.

12.2. Daily battery threshold -Menu Option ‘92’

To disable the daily diagnostic activity (and thereby prevent any unscheduled or emergency Release Event), enter a value of 000 (zero, zero, zero) -***see Note 1*.** Alternatively, to scale this (3 digit) internal constant into real voltage values, use the formula:

$$\text{Value} = \frac{\text{Voltage}}{0.025}$$

Where: Voltage is the desired Battery voltage threshold, in volts.
Value is the 3 digit (integer only) number input by the user
eg. the factory default of 5.0VDC has a value of 200.

User:
Buoy:
User:
Buoy:

```
92
200: _
000
>_
```

Note 1.
Such a setting will, in addition, disable the leak detector and thereby prevent the occurrence of any emergency Release Event as a consequence of a leak.

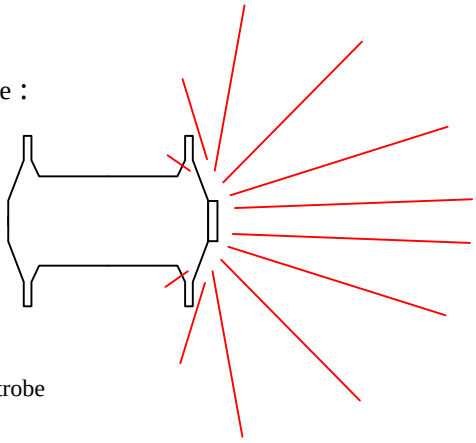
12.3. Set time/date confirmation option - Menu Option '94'

Determines whether a second (ie. a confirmation) Date and Time are required when entering Release Event information. It does not apply to Setting Buoy Clock.

'00' (zero, zero) = confirmation not required.
'01' (zero, one) = [default value] confirmation is required.

13. FIOBUOY® STROBE SUPPLEMENT

In night conditions, even the Fiobuoy®'s bright colouring can be difficult to see :



- STROBE OPTION -

GENERAL

- Visibility is from 500 to 1000 meters depending on conditions.
- To maintain the Fiobuoy®'s existing geometry and robustness, the Strobe is mounted internally, the light transmitted through the Nylon End Cap (*the Jaws end*).
- When the Fiobuoy® prepares to surface (releases the pin from the Jaw) the Strobe automatically activates, allowing retrieval in night conditions.
- The power supply for the Strobe is completely separate from the Fiobuoy®'s own power, and is a pack of 4 x AA Alkaline Cells connected as 3VDC (+ 2 pin connector).
- The Strobe is configured so that, as batteries drain, the flash intensity level does not diminish, however the time between flashes lengthens from it's initial value of approx 1 second (up to approx 10 seconds after 8 hours).

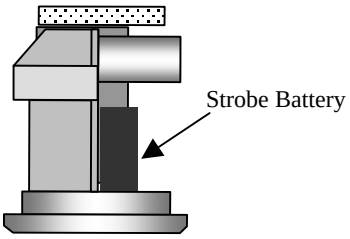
WHAT'S NEW FOR YOU ?

Fiobuoys fitted with the Strobe option have 3 differences for Users:

1. Software revision is 2.3 (as seen on the programming screen)
2. During a programming session to set a Release Event (closing the Jaws), an extra response is now required:
   `Enable Strobe ? [y/n]:`
   Only responding with a '**Y**' or '**y**' will 'enable' the strobe to activate when it surfaces.
   (note: The Strobe won't actually turn on at this stage)
3. Once the Buoy is retrieved and back on deck, the Strobe is turned off by:
   a) plugging in the Communications lead (and Hand Controller/PC)
   b) Pressing 'Enter' till the strobe stops. Note: For best results, do this *between* Strobe flashes.

BATTERY REPLACEMENT

1. Open the Fiobuoy® using the Maintenance Tool, and remove the Mechanism Assembly in the usual way per this manual.
2. Battery pack is located under the Motor and held in place with a metal backet.
3. Unplug the existing pack, and remove it from the mounting.
4. Install the new pack into the mounting and plug it in to the connector.
5. Re-install the Mechanism Assembly into the Fiobuoy®.



WARNING! DO NOT OPEN THE STROBE ELECTRONICS BOX !
IT STORES HIGH VOLTAGES FOR LONG PERIODS, EVEN WITHOUT BATTERIES.

OTHER

- An extra 'Hidden Menu Option' is included for maintenance. Type **95** at the Command Prompt to perform an immediate test of the strobe. Pressing 'Enter' terminates the test.
- Another 'Hidden Menu Option' is available as **96**, for you to enter a single digit (only, 1-9) which a limit in whole hours, that the Strobe will flash for, in the event it is not turned off by the User (default = 1hr).
- NOTE: The Fiobuoy's usual battery indications are not related to the Strobe's separate battery pack. The best way to get an indication of these, is to use Option 95, to see how far apart the flashes are.

14. Parts List

Part Number	Description
25-240-101	Direct-Contact Infra-red Communication Cable
25-522-103	Maintenance Kit (incl O-rings and Battery Pack [excl Strobe])
25-521-102	Battery Pack, 3V for Strobe Option Fiobuoys
40-211-001	**Rope** - Aquatec® 10mm Dia. 1,300kg, /m (without splice/fittings)
40-210-001	**Rope** Dyneema® PP 10mm Dia, 5000kg, /m (without splice/fittings)
40-550-101	Stainless steel thimble and splice Dyneema rope
40-550-102	Rope Splicing/Stainless Steel fittings Aquatec rope
25-510-103	Tool 'kit', Maintenance – Time/Date or Acoustic Fiobuoy (for both EndCaps)
25-210-101	Psion Workabout controller option
25-210-102	Winder, Deck Model (for 100/200m Model Fiobuoy®)
25-110-103	Winder, Deck Model (for 100m Model Fiobuoy® only)
52-210-103	Winder, Mini (for 100/200m Model Fiobuoy®)
25-521-101	Battery Pack, 4 Cell, 6.0V for Time/Date Fiobuoy®
50-113-102	O-ring, for all model Fiobuoys
20-241-201	Sacrificial Anode, 28mm
25-520-102	Release Pin, S'Steel 12mm with Shackle
20-210-121	Fiobuoy Shell Moulded, 100m, Red
20-210-221	Fiobuoy Shell Moulded, 200m, Red
20-310-101	Fiobuoy Release Mech Assy, Complete, Time/Date, 160mm incl Batt
20-410-101	PCB, Fiobuoy Time/Date Model complete
50-227-101	Motor/Gearbox for Fiobuoy 100/200m
20-110-Z000 -MI-C-W1	**Fiobuoy® ACOUSTIC** Model, **100m** depth capacity, 120m rope capacity, - Without rope
20-120-Z000 -MI-C-W1	**Fiobuoy® ACOUSTIC** Model, **200m** depth capacity, 220m rope capacity, - Without rope
20-110-Z000 -MI-C	**Fiobuoy® TIME/DATE** Model, **100m** depth capacity, 120m rope capacity, - Without rope
20-120-Z000 -MI-C	**Fiobuoy® TIME/DATE** Model, **200m** depth capacity, 220m rope capacity, - Without rope

15. AVOIDING PROBLEMS - A LAST WORD

15.1. General Saftey and Complience Obligations

- **Release Event** Time/Date. Take care to note **and record** the Release Event date and time you program into the FIOBUOY® . Then have someone verify them ! **This cannot be stressed too strongly !** Anyone who has ever mis-programmed a VCR will understand how easily errors can occur. Unlike VCR programming however, the consequences of mis-programming the FIOBUOY® are more severe, and will more than likely result in the loss of your equipment ...forever. Similarly, ensure the internal clock/calender is accurately set with the correct time and date.

- Equally important is the need to record the precise location at which deployment has occurred. Access to a GPS device and log book should be sufficient to record the relevant details.

- Always check to ensure that the deployment depth is significantly less than the length of rope attached to the buoy, otherwise a fully extended tether line will not permit the FIOBUOY® to reach the surface. Consideration should also be given to tidal conditions which again, may affect the depth of deployment.

- Do **not** deploy the FIOBUOY® to depths beyond it's rated depth without first securing written advice from Fiomarine Industries Pty Ltd in relation to possible breaches of warranty.

- Ensure that the anchor/payload attached to the FIOBUOY® is of sufficient weight to promptly submerge the buoy and to hold it steady in the same location for the desired deployment period, despite the existence of any prevailing currents.

- None of the **time and date** information is held or saved inside the Psion ***work****about* unit (or your PC). It is **retained inside the FIOBUOY® only**.

- All FIOBUOY® deployments must be undertaken in a manner which complies with the laws of the States and Territories of the Commonwealth of Australia. Users are encouraged to seek advice from their respective, local authorities.

- Users must take special precautions to ensure that deployments do not endanger surface craft or any other users of marine resources.

- The FIOBUOY® is equipped with safety devices to assist with its recovery from deployments in the events of **(a)** a diminution in battery power supply (below a prescribed threshold) and **(b)** the occurrence of leaks. In either case, the FIOBUOY® will attempt to perform an unscheduled Release Event ie. it will attempt to release itself from its underwater mooring and float to the surface for eventual recovery. In such circumstances, the FIOBUOY® may remain on the surface for a considerable period until retrieved by the user/owner. During the time it remains unattended, it may constitute a hazard to surface craft.

  These safety devices can be disabled by a simple process following further consultation with an authorised dealer or with Fiomarine Industries Pty Ltd. This course of action would remove the incidence of unscheduled releases but, would also remove the safety features which were designed to assist in recovering the device and its attached assets during the events described above. However, the safety devices can also be "switched" (ie. reprogrammed) back on to accommodate

changing circumstances and consequently, users are provided with a reasonable degree of operating flexibility when planning their deployments. We emphasise that successful and safe deployments will therefore, require careful and thorough planning.

- The FIOBUOY® contains sensitive electronic equipment; avoid dropping the unit on to hard surfaces to prevent possible damage.

- Frequent deployment in a severe environment could necessitate more frequent servicing/maintenance checks at say, 6 - 9 month intervals instead of the regular 9-12 month intervals. Conduct external maintenance on a routine basis.

- Be aware of the implications of programming a Release Event to occur during a different time zone eg. when programming a Release Event (during Standard Time) to occur during Day Light Savings/ Summer time etc. Adjust times accordingly.

- Take care with the Optical Communications Socket (at the Jaws end of the FIOBUOY®.Dirt and other material (and of course marine growth) may damage the Infra-Red communications light path during cleaning.

- Very strong sunlight can disrupt communications. If this occurs, try placing the Optical 'connection' in the shade.

- If communications stop when using the PSION ***work****about* , it is possible its batteries do not contain sufficient residual energy for this purpose (even though the device correctly performs all other functions). Replace the batteries accordingly.

- The PSION ***work****about* has a dust/splash proof rating of only IP54, so keep it protected appropriately (IP54 = limited protections against dust, and fine water spray).

- When placing the FIOBUOY® in storage for any period of time, be aware that an already programmed Release Event during that storage period ***will*** occur even though the FIOBUOY® is not submerged. This could cause personal injury or damage to equipment. It is also recommended to remove the battery pack for long storage to guard against chemical leakage of the battery.

- During a test routine, any communication with the FIOBUOY® at the time a programmed Release Event is scheduled to occur, will automatically cancel that Release Event.

- The **Leak Detector**. As standard feature, this sensor is intended for use in sea water only. Should you wish to deploy in fresh water, a different sensor should be installed. Please consult with Fiomarine Industries Pty Ltd in this instance.

15.2. Battery Life

The anticipated battery life specification is, by necessity, only a best estimate based upon **anticipated average use**. It should be pointed out though, that a number of factors will affect battery life:

- The total number of Jaw Actuations per year,
- The 'frequency' of Jaw Actuations,
- Temperature (low temperatures de-rate the battery)

Additionally, although the FIOBUOY® does have built-in defaults to prevent deployment with a low battery, these too are based on average use. Not everyone will fall into this "average use" category. As an illustration, consider this extreme scenario:

> *Suppose when programming the Release Event time/date (and loading the Pin etc ready for deployment) that the battery is just above the 'too low' level, and as well, the ambient room temperature at the time is a warm 25ºC.*

Now, if a particularly long deployment time is planned (say 12 months), and the water temperature is expected to be quite low, a successful release cannot be absolutely assured.

As the user has absolute discretion over how and where the FIOBUOY® will be used, a certain amount of responsibility must be accepted in planning deployments. As an aid, Battery voltages are taken and reported with all Jaw Actuations. The (average / generalised) point at which the Battery is considered 'too low' is when it falls below 5.0 volts under stable load (ie. 1 second after the jaws begin to move).

It should be noted too, that a **second threshold** exists - Daily Low Battery Threshold: When the FIOBUOY® awakens each day (at the programmed time of day), it checks battery voltage (with no 'load') also. Should this voltage be below a critical level, an attempt is immediately made to open the Jaws, as a last ditch effort to bring equipment to the surface with what ever power is left.

This Daily Low Battery Threshold can be altered. See Section 6.2

16. CONTACTING US

If you require any further assistance with matters concerning the above warranties, please contact either your local dealer or, Fiomarine Industries Pty Ltd at the following address:

Hobart Office
30-38 Innovation Drive Glenorchy
Tasmania 7010 Australia

Phone +61 3 62726167 Fax +61 3 62726264

E-mail: fiobuoy@fiomarine.com

Website: www.fiomarine.com

Trademarks are the property of Fiomarine Investments Pty Limited.